



Managing Climate Change and Securing a  
Future for the Midwest's Industrial Base

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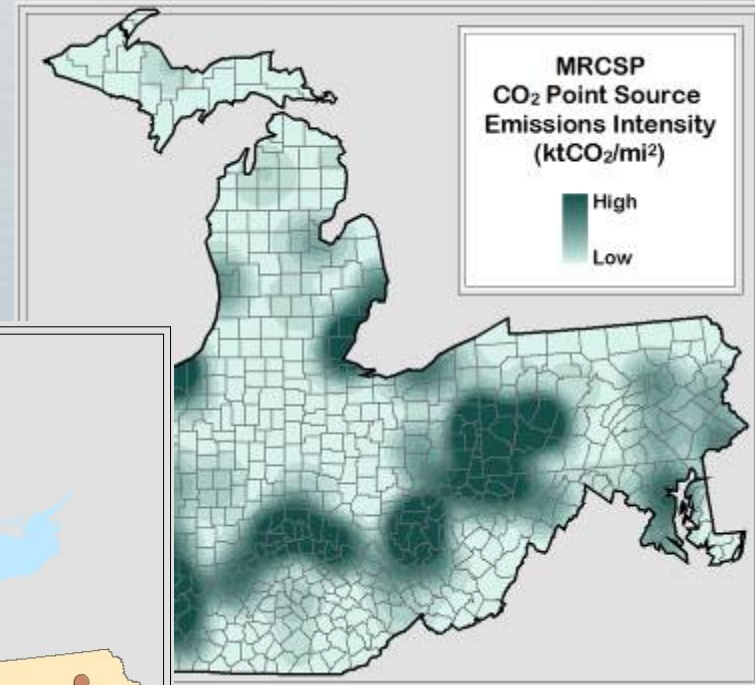


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DOE 5<sup>th</sup> Annual CCS Conference,  
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May 11, 2006  
DOE Cooperative Agreement No. DE-FC26-05NT42589

# The MRCSP Region: The “Nation’s Engine Room” has a vested stake in sequestration

- One in six Americans
- 1/6 of U.S. Economy
- 1/5 of U.S. Electricity Generated
  - $\frac{3}{4}$  From Coal

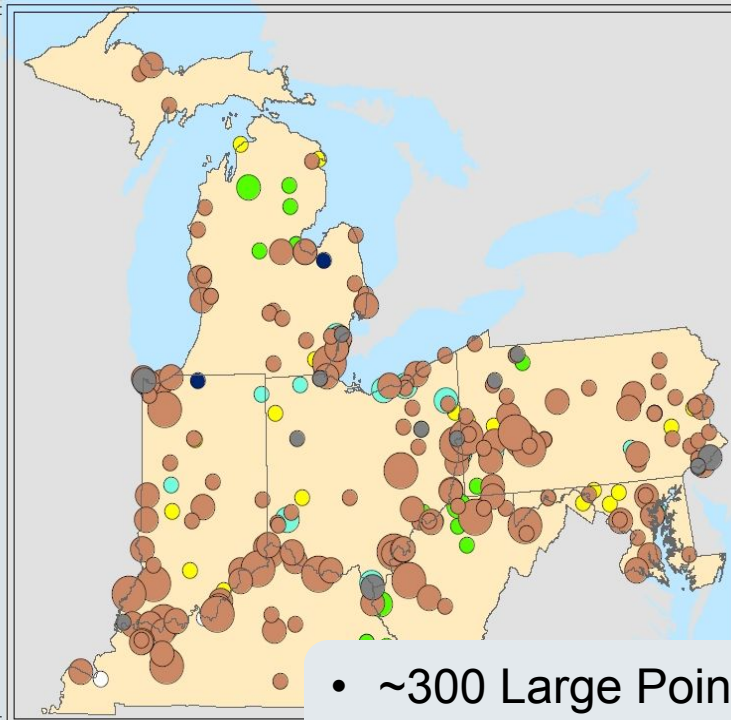


## MRCSP Large CO<sub>2</sub> Point Sources (100+ kt CO<sub>2</sub>/yr)

- Cement
- Ethanol
- Ethylene
- Gas processing
- Hydrogen
- Iron & steel
- Power
- Refineries

ktCO<sub>2</sub>/yr

- 100 - 2,000
- 2,000 - 10,000
- 10,000 - 20,000



- ~300 Large Point Sources (>100,000 tonnes/year)
- ~800 Million tonnes CO<sub>2</sub>/year

# The geological potential of the region is vast and well positioned relative to sources

**Deep saline formations:  
~475,000 MMTCO<sub>2</sub>**

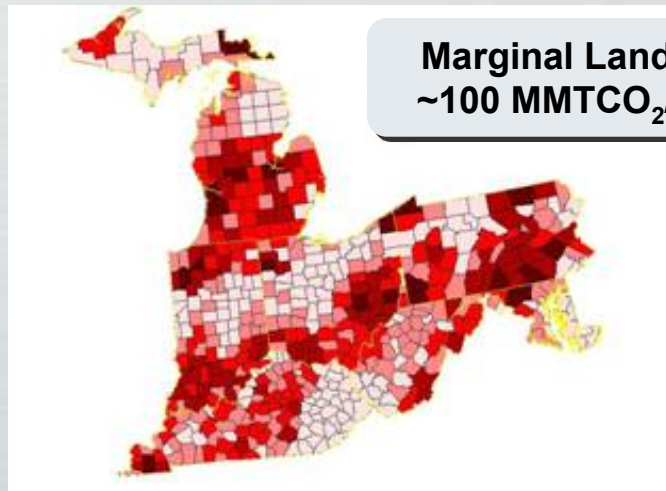
**Depleted oil and gas fields  
~1,400 MMTCO<sub>2</sub>**

**Unmineable coal and shale  
~350 MMTCO<sub>2</sub>**

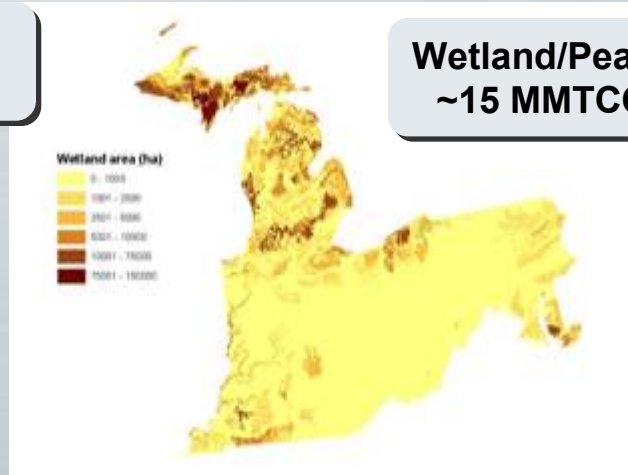
**Data from over 80,000  
wells have been analyzed**



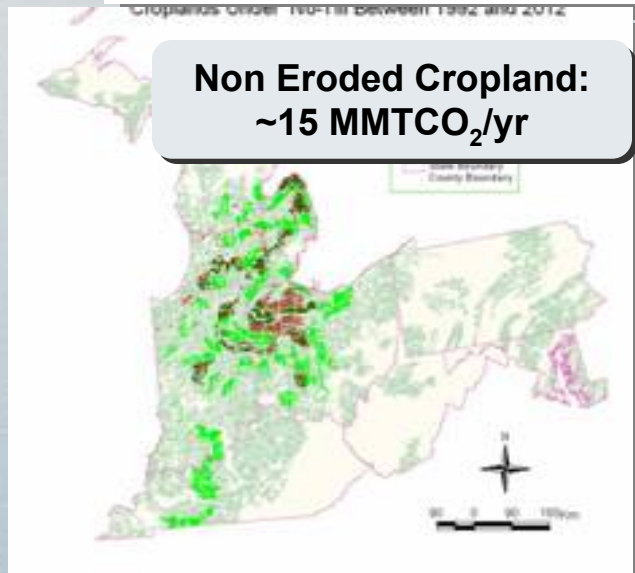
# The terrestrial sequestration potential in the region is also large



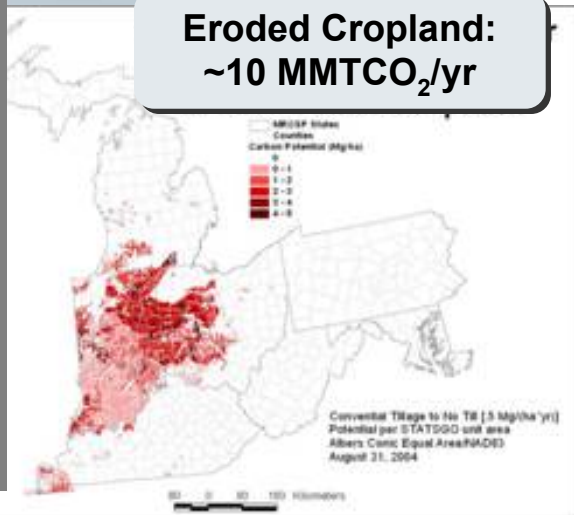
**Marginal Lands:**  
~100 MMTCO<sub>2</sub>/yr



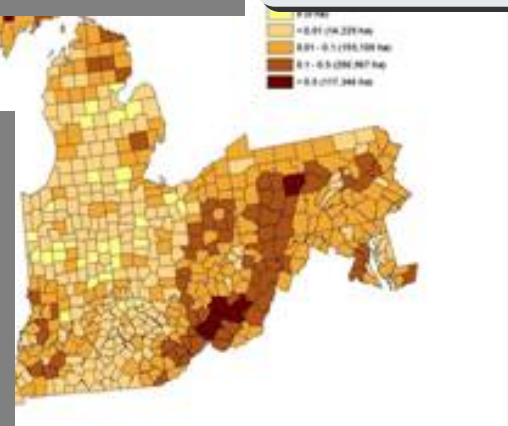
**Wetland/Peatland:**  
~15 MMTCO<sub>2</sub>/yr



**Non Eroded Cropland:**  
~15 MMTCO<sub>2</sub>/yr

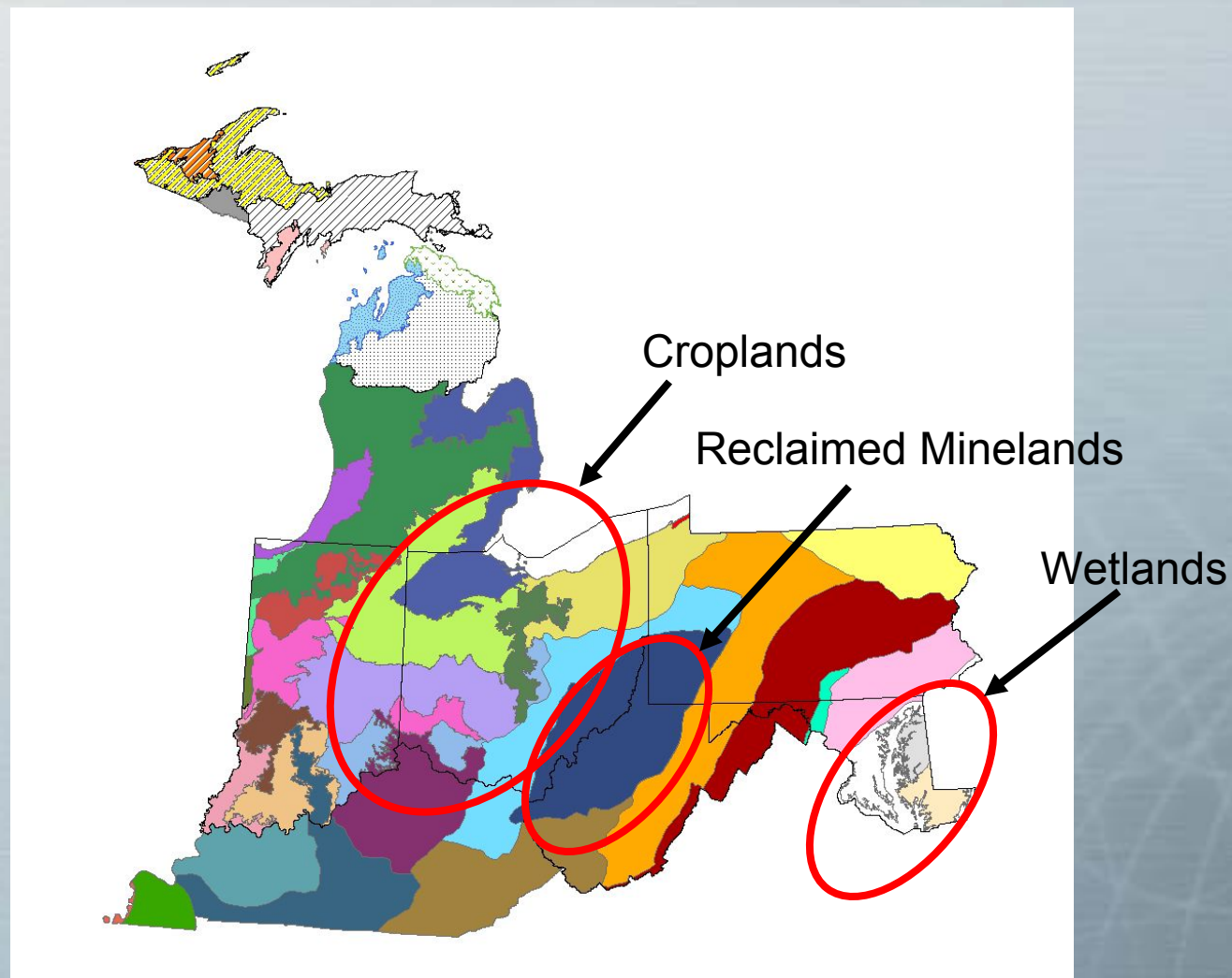


**Eroded Cropland:**  
~10 MMTCO<sub>2</sub>/yr



**Minelands:**  
~5 MMTCO<sub>2</sub>/yr

# Terrestrial Sequestration – three projects being pursued





# Quantifying the effectiveness of conservation tillage on croplands

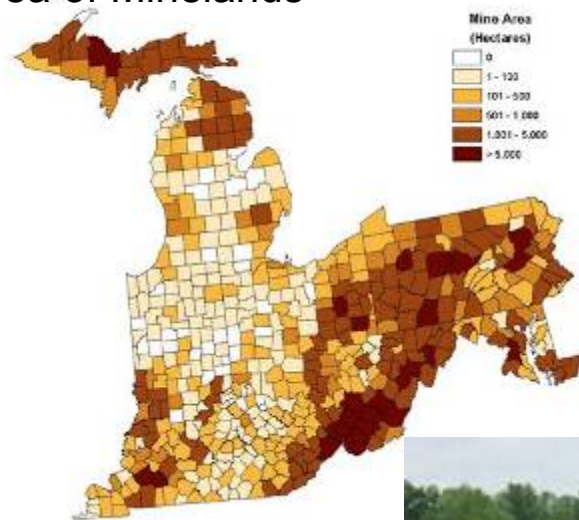


MRCSP Researcher Collecting Soil Samples on No-till Plot



# Investigating the effectiveness mineland reclamation practices on sequestration

Area of Minelands



Mineland prepared for reclaiming



Reclaimed Mineland in Ohio



# Evaluating the potential of reclaimed wetlands for sequestration

Blackwater Area (Eastern Maryland)



Crop Planting



1938



1989

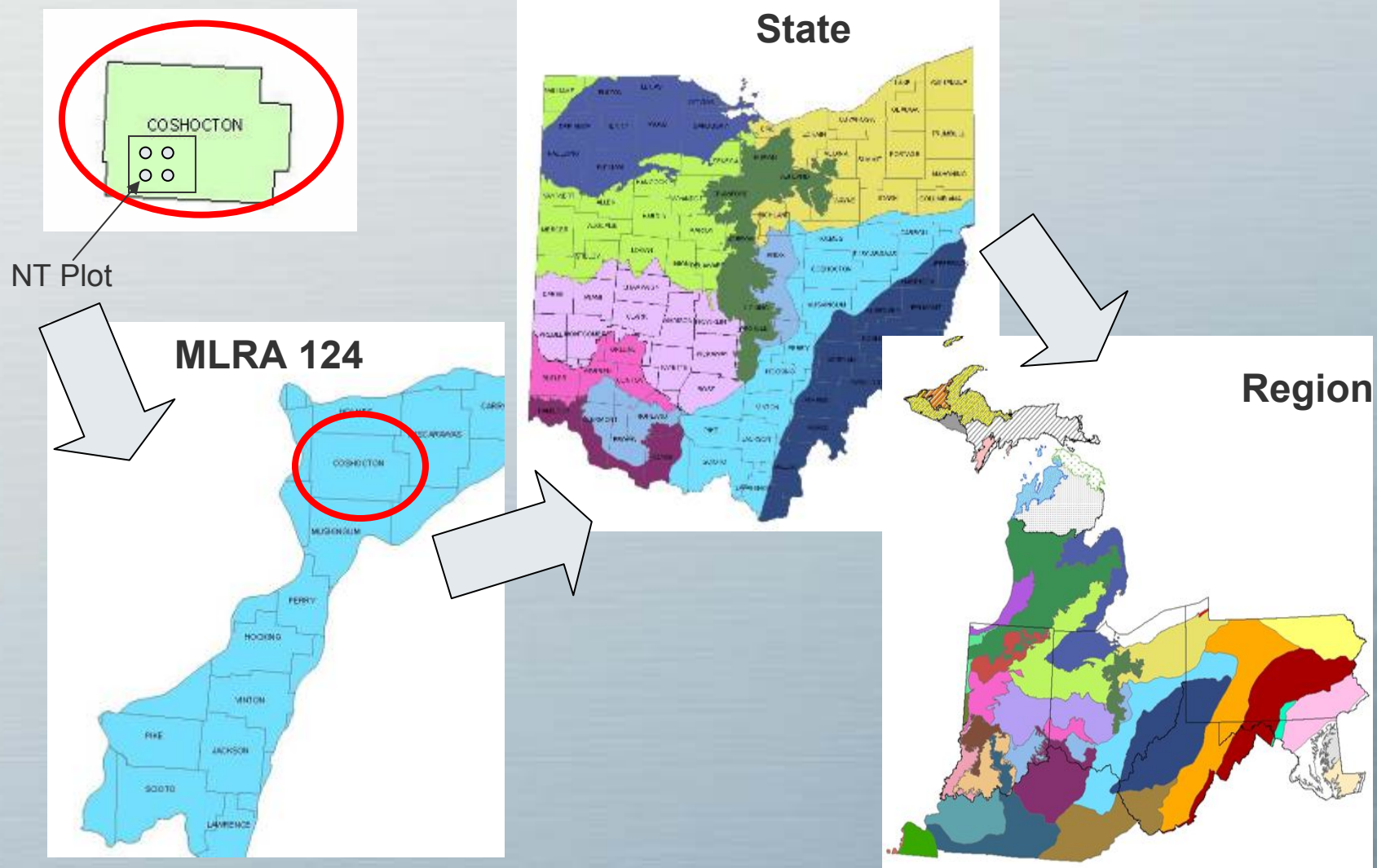
The Disappearing Marsh



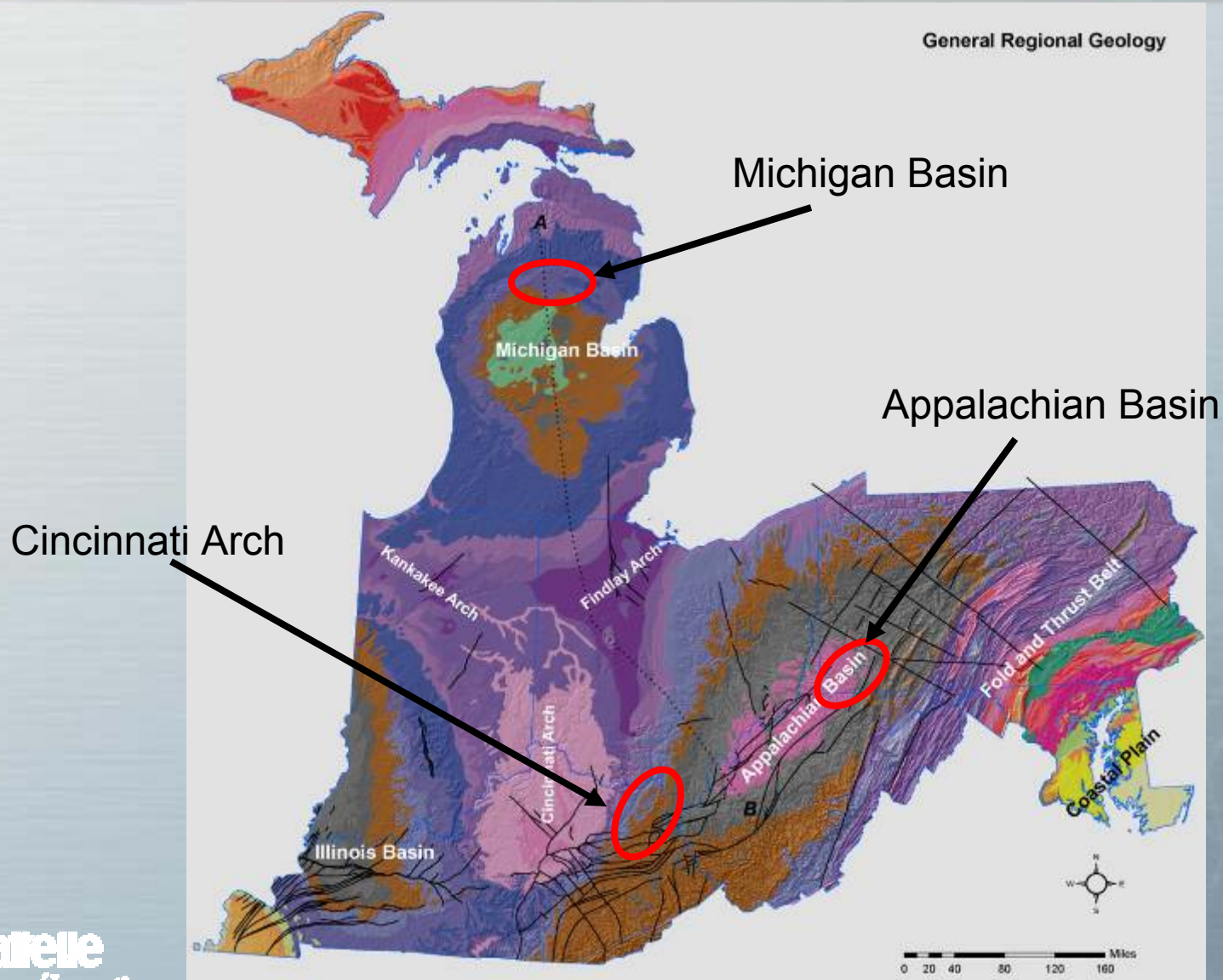
Soil Sampling Apparatus



# Extrapolation of terrestrial results to region through MLRAs



# Geologic Storage – three sites are being characterized for possible injection tests





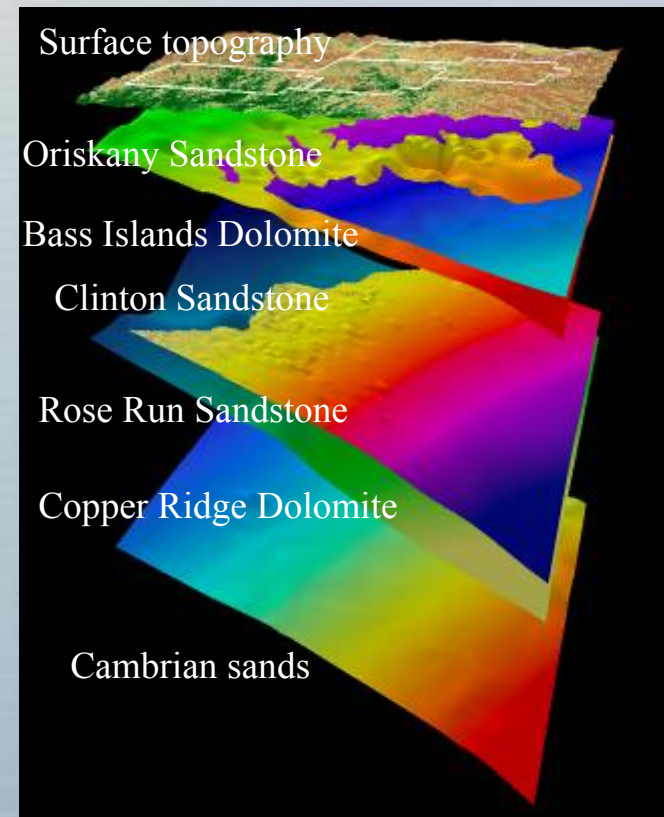
# Appalachian Basin Site – FirstEnergy



FirstEnergy's  
R. E. Burger Plant

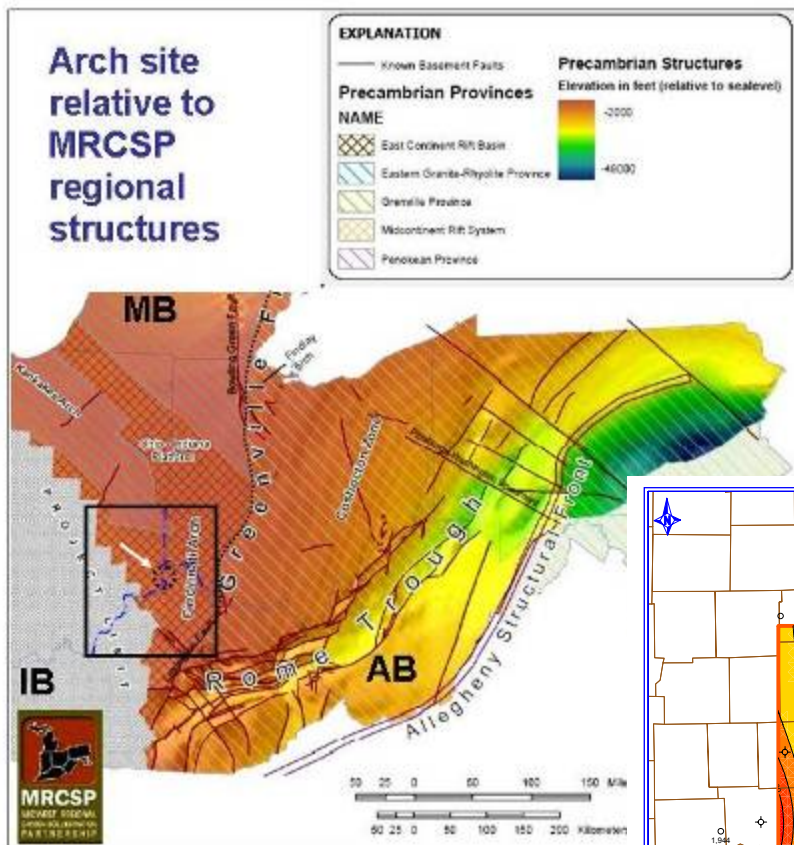


Powerspan ECO  
Pilot Plant

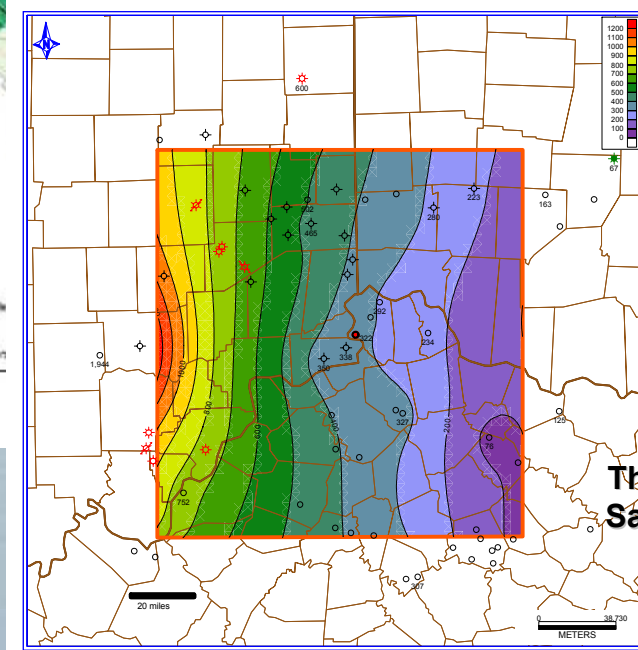


Geologic Mapping of  
Appalachian Site

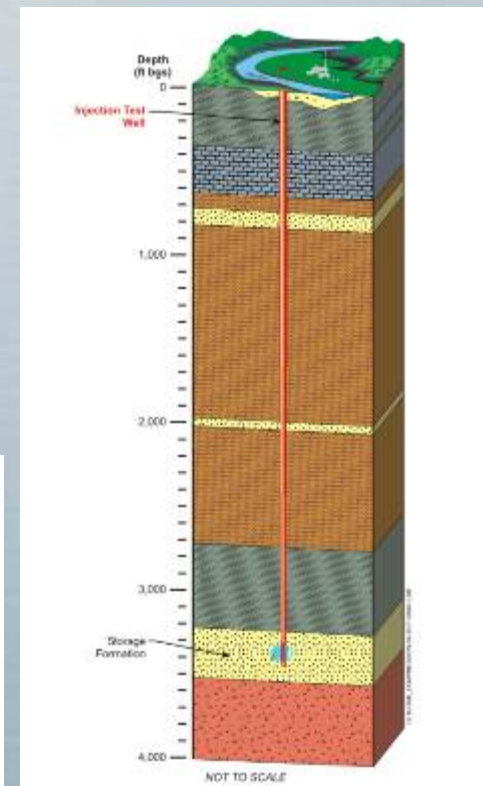
# Cincinnati Arch Site – Duke Energy



Site Geologic Overview



Thickness Map of Mt. Simon/Basal Sandstone for Cincinnati Arch Site



Well Concept



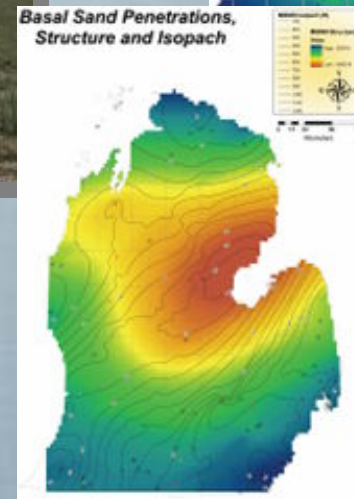
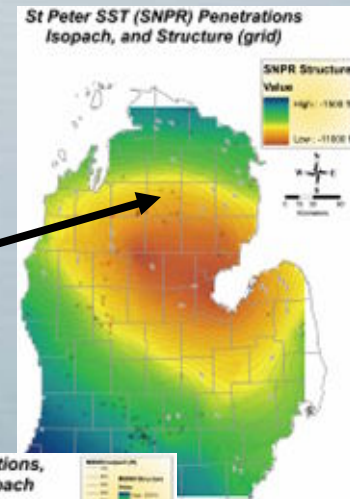
# Michigan Basin Site – DTE Energy



CO<sub>2</sub> Pipeline  
Currently for EOR

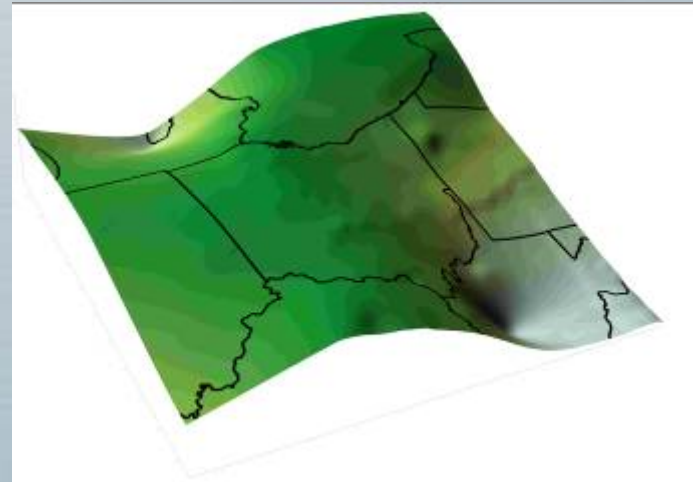


CO<sub>2</sub> Compression Plant



# Regional “Piggyback” Characterization

- Leverage oil & gas drilling to expand information on CO<sub>2</sub> sequestration potential in deeper targets that are not well-defined in the region.
  - e.g. drill deeper wells, run more logs, and pull more core in cooperative agreements.
- Integrate data into regional models



*We are currently evaluating opportunities throughout the MRCSP region.*



# Our research into regulatory issues will continue into Phase II

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- Permitting for Demonstration Projects
- Training for regulatory officials on Consensus-Building and Interagency Coordination
- Tracking Regulatory Changes
  - New Statutes and Regulations
  - Cap and Trade Debate
- Best Practices Report

# Our outreach activities will intensify in Phase II in support of field projects

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- Identify key stakeholders near host sites and communicate with them early to ensure they are fully aware of plans and progress
- Conduct interviews and focus groups in non-host site locations
- Incorporate lessons learned from Phase I and the other field demonstration projects
- Assist host partners in planning and conducting outreach to employees, local citizens, government and other stakeholders (briefings, site tours)
- Initiate a region-wide education program through the Ohio Energy Project
  - Training provided through the Keystone Center curriculum
  - Priority to be given to host site locations, if desired by the host site
- Continue briefings and other communications with key civic, governmental and environmental groups region-wide
- Follow up telephone calls to key stakeholders region-wide



# Our web site ([www.mrcsp.org](http://www.mrcsp.org)) is an important means of communication



The screenshot shows the MRCSP website homepage. At the top left is the MRCSP logo with the text "MRCSP MIDWEST REGIONAL CARBON SEQUESTRATION PARTNERSHIP". To its right is a "WHAT'S NEW" section titled "Overview of Phase II Activities (October 04, 2009)" with a brief description and a "Read More" link. Below the logo is a blue sidebar menu with links: Home, Join Our Mailing List, Learn about Climate Change and Carbon Sequestration (with sub-links for Climate Change, Carbon Sequestration, and We Want to Hear from You), About MRCSP (with sub-links for Regional Partnerships, Midwest Regional Carbon Sequestration Partnership, and Team List), Fact Sheets, Links & Resources, Presentations, What's New, and Members Area. The main content area features a large image titled "Managing Climate Change and Securing a Future for the Midwest's Industrial Base" showing a collage of industrial and natural scenes. Below the image is a paragraph of text explaining the MRCSP's mission and goals, and a contact email address: [ballid@battelle.org](mailto:ballid@battelle.org).

We plan to expand it to provide information for stakeholders on each of our demonstration projects

# Our partner team is a strategic asset as well as a source of funding



U.S. Department of Energy/NETL

**Battelle**  
The Business of Innovation







# MRCSP

MIDWEST REGIONAL  
CARBON SEQUESTRATION  
PARTNERSHIP